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# The impact of the Covid-19 lockdown on the human experience of nature

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## HIGHLIGHTS

- During the COVID-19-lockdowns, the relationship between human and wildlife has been placed under a global spotlight.
- We showed how such lockdowns had impacted the human experience of nature.
- People observed and interacted more with other species, learn new things from them and felt less lonely thanks to them.
- The lockdown reveals to which extent our experience of nature is embedded in social, cultural and political contexts.

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## ABSTRACT

The Covid-19 pandemic has resulted in extensive lockdowns implemented all around the world and billion of people have been asked to stay at home for several weeks. Although this global confinement has had potentially huge unintended consequences on the environment and on its associated wildlife, this study shows that it has also impacted the human experience of nature. Based on an online questionnaire, this study aims to assess how the significant changes in people's everyday lives induced by the French lockdown impacted their relationship with other species. Participants did not only observe and interact more with non human species, but also discovered new traits characterizing them, and felt less lonely thanks to them. The impact of the lockdown was stronger on people's relationship with their pets, farm animals, home plants and with birds than with other plants and animals. This study further demonstrates that participants with different profiles have been affected differently. In particular, women and people with better access to nature were clearly more sensitive to changes and have been more positively impacted in their relationships with other species. Acting as a real world experiment, the lockdown reveals to which extent our experience of nature is embedded in social, cultural and political contexts.

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## 1. Introduction

In December 2019, the Coronavirus SARS-CoV-2 appeared in China and spread worldwide before to being declared on March 2020 by the World Health Organization as a pandemic. In order to face the Covid-19 outbreak, governments around the world imposed strong restrictions to their populations such as keeping physical distance, stopping non-essential activities and limiting the movements of people. This global "lockdown" resulted in almost two thirds of the world population being asked to stay at home and placed under a confinement by April 2020. Since then, in many parts of the world, such drastic measures have also been reactivated to face the second and third waves of the pandemic.

Besides investigating the outbreak dynamics, researchers around the world studied the diverse unintended consequences of the lockdown such as the impact on economy and finances (e.g. [Huo and Qiu, 2020](#);

[Kanu, 2020](#)), mental health and psychology (e.g. [Guessoum et al., 2020](#); [Singh et al., 2020](#)), education (e.g. [Mishra et al., 2020](#); [Alvi and Gupta, 2020](#)) or social relationships (e.g. [Dewitte et al., 2020](#); [Sommerlad et al., 2020](#)).

As suggested by [Bates et al. \(2020\)](#), the global confinement also represented a unique opportunity, a world scale lab-in-the-field experiment, for environmental researches. Scholars have documented the consequences of the lockdown on carbon emission ([Evangelidou et al., 2020](#); [Han et al., 2021](#)), air and water quality ([Menut et al., 2020](#); [Dutta et al., 2020](#); [Chen et al., 2020](#)), noise disturbances ([Aletta et al., 2020](#); [Basu et al., 2020](#)) or light pollution ([Bustamante-Calabria et al., 2020](#)). They also assessed how the Covid-19 crisis impacted biodiversity. In this perspective, their main interest was in understanding of how non human species can adapt to rapid transformations of their environment and whether or not nature has recovered from this unprecedented reduction of human activities. As for examples, [Derryberry et al. \(2020\)](#) showed that the reduction in traffic noise led to a shift in song frequencies in a bird species. [Gordo et al. \(2020\)](#) revealed that although

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birds detectability increased in Spanish urban areas, the probability of their occurrence remained stable.

Overall, with the emergence of the Covid-19 zoonosis, the relationship between human and wildlife has been placed under a global spotlight (Gaynor et al., 2020). The pandemic reveals the complex and interacting pathways in which animal populations and habitats are intrinsically connected to human health and livelihoods. Little has been said, however, regarding the impact of the lockdown on people's relationship with nature, especially in terms of their daily interactions with the environment and living creatures. How can this "anthropause", as a dramatic slow down in human activities (Stokstad, 2020), affect human experience of nature?

It is acknowledged that people in western societies have fewer and fewer direct contacts with natural environments and their associated wildlife in their everyday lives (Turner et al., 2004; Soga and Gaston, 2016). For instance, it has been shown that in Japan, older people had more frequent experiences during their childhood with flowering plants and with more diverse species than younger ones (Soga et al., 2018). Similarly, the proportion of US children participating in outdoor activities as well as the time spent outdoors dramatically decreased over the last decades (Hofferth, 2009).

Some authors recently claimed that the ecological crisis could be first of all related to a loss of sensitivity of modern societies toward the living (Morizot, 2020). Indeed, it is recognized that this "extinction of experience" of nature (Pyle, 2011) can have deleterious consequences not only on human well-being but also on people's emotional, attitudinal, and behavioral relations to nature and biodiversity (Turner et al., 2004; Chan et al., 2016; Prévot et al., 2018).

In that perspective, the Covid-19 crisis and its associated lockdowns provide an opportunity to understand how a major change in society can impact human experience of nature. Only a few studies have documented the effect of the lockdown on people interactions with their environments. Part of them have been dedicated to demonstrate the importance of greenspace access for people living in urban areas (Biswas and Sen, 2020; Kleinschroth and Kowarik, 2020; Derks et al., 2020; Venter et al., 2020; Ugolini et al., 2020). Other studies have shown how the lockdown impacted birders behaviors and activities (Randler et al., 2020), explored how digital instruments and virtual portals helped people to connect to nature and reduce anxiety (Zabini et al., 2020; Jarratt, 2021) or analyzed the impact of animal ownership on mental health and loneliness (Bowen et al., 2020; Ratschen et al., 2020).

This study aims at understanding how the significant changes of people's lifestyle generated by the French confinement impacted their experience of nature in terms of their relationship with other beings. Based on an online questionnaire, I first assessed the impact of the Covid-19 lockdown on the way people observed, interacted, learned from different species and how the latter helped them to feel less lonely. I then evaluated whether people of different profiles were impacted differently.

## 2. Methods

### 2.1. Context of the study

From March 17th 2020 to May 11th 2020, the French authorities established a state-wide lockdown stopping all "non-essential activities". Apart from food retail sector and healthcare institutions, most of the other activities were brought to a halt. People were asked to stay home as much as possible and were allowed out only to meet their basic needs. A 1 h per day permission was also granted to exercise, walk pets, get some fresh air within 1 km maximum of one's place of residence.

### 2.2. Questionnaire implementation

Using the Limesurvey software (Limesurvey GmbH), I proposed an online questionnaire running from the April 8th 2020 to May 11th 2020 (end of the first French lockdown). The questionnaire was written

in French and was available to anyone over 17 years old and living in France (mainland). The study was fully independent and has not been commissioned by any public or private organisms.

The questionnaire was composed of a short preamble describing the aim of the study, some explanations on how to answer it, and 24 questions. It has been released via social networks, emails, and local media. The estimated time of answer was about 15 min.

The first part of the questionnaire (9 questions) focused on the participants' profiles. I asked people for their gender, their age (between 18 and 40 years of age, between 40 and 60, above 60), their education (higher than high-school degree or not), their geographic location (city, outskirts, countryside), their access to nature (no access, access to parks, access to natural areas), whether they had a garden or not, whether they were students/workers or not (unemployed, retired), whether they were confined alone or not and since when (number of weeks) and whether they were familiar, through education, profession or pleasure, with biodiversity study, management, or protection (note however, that, due to a mistake in implementing the questionnaire online, only 575 participants answered this last question).

The second part of the questionnaire (15 questions) was dedicated to the effect of the lockdown on the respondents' relationships with the species of 5 different groups: pets and farm animals of the respondents ("Own animals"), indoor and outdoor plants and trees of the respondents ("Home plants"), birds ("Birds"), plants and trees outside the respondents home ("Other plants"), animals which are not considered as pets, farm animals or birds ("Other animals").

I assessed the impact of the lockdown on the respondent observation/interaction, learning, and loneliness following three questions respectively: i) since the beginning of the lockdown, have you been spending more time observing or interacting with [species group]? If yes, please specify where and how. ii) Since the beginning of the lockdown, have you discovered new behavioral, biological or morphological traits from [species group]? If yes, please specify which ones. iii) Since the beginning of the lockdown, have you felt less lonely thanks to [species group]? For the first two questions, people had four choices: "No, less than before", "No", "I don't know", "Yes". For the third question, people had three choices: "No", "I don't know", "Yes".

### 2.3. Participant profiles

I obtained a total of 1292 complete answers (see Appendix 1). Most respondents were women (70%), did not live alone (83,2%) and had at least a high-school degree (81%). Forty one percent lived in the countryside, 39% said they had a direct access to nature when going out, and 70% had a garden. When they answered the questionnaire, more than half of the respondents had been confined for 4 to 5 weeks whereas 11% had been confined for 1 to 3 weeks and 30% for 6 to 8 weeks. Fifty-four percent were aged 18 to 40, 32% 40 to 60 and 14% above 60. Finally, 32% declared they were not familiar with biodiversity study, management, or protection (estimation based on the 575 respondents who had access to this question).

### 2.4. Analyses

All the analyses have been conducted for each group of species and function of each of the considered impacts (observation/interaction, learning and loneliness). For the sake of simplicity, answers "I don't know" and "No, less than before" have been considered as "Not Available" and "No" respectively. Indeed, only a small number of both types of answers were found (see Appendix 1).

I first analyzed the proportion of the participants who declared they were positively impacted by the lockdown as far as their relationship with other species were concerned (Fig. 1). I also used the qualitative information given by the participants ("if yes, please specify where and how", "if yes, please specify which ones") to provide a complementary assessment of the lockdown impact.

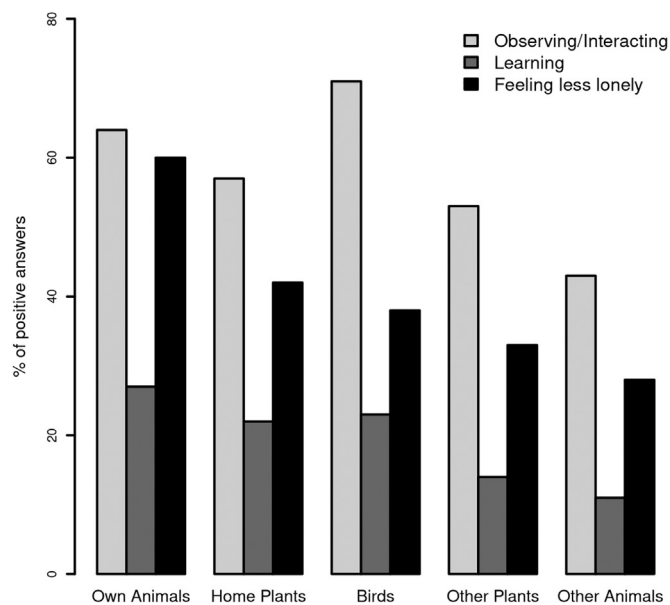


Fig. 1. The impacts of the lockdown on people relationship with other species.

I then analyzed the effect of the participants profiles (variables described in the previous section) concerning the lockdown impact on their relationship with other species. For this part of the study, I discarded the answers of people whose gender and nature access was “other” ( $n = 6$  and  $n = 93$  respectively). For each species group and each considered impact (i.e. observation/interaction, learning, loneliness), I ran generalized linear models (GLM) in order to test for the effect of each variable, holding the effects of the other variables constant. In all 15 models, as the categories of answers (i.e. the dependent variables) were binary (“Yes” or “No”), I fitted the models using a binomial error structure and logit link function (McCullagh and Nelder, 1989). The models were fitted in R (version 3.6.3; R Core Team, 2020) using the “glm” function.

For each model, the selection of the used variables was made according to a step by step descending process. In such an approach, the performance of the model is iteratively increased by removing at each step the least important variable. The selected model is the one for which the suppression of a new variable does not increase its performance. The performance was assessed using the Akaike Information Criterion (AIC). Such selection was made using the “step” function in R.

The detailed results of the different models are presented in Appendix 2. For the sake of simplicity, within the main manuscript (Table 1), I present only the significance of each variable ( $p > 0,001$ ) for each of the considered models.

### 3. Results

#### 3.1. The impact of the lockdown

Overall, the lockdown had a positive effect on people relationships with the other species (Fig. 1). The most important effect was on the respondents observation and interaction with other species. More than 65% declared they observed and interacted more with their animals and plants as well as with birds and more than 40% with other animals and plants. Fewer declared that they learned something new (from 20% and above for home plants, own animals and birds to 15% and less for other plants and animals). While 30 to 40% of the participants declared that other animals and plants, birds and home plants helped them to feel less lonely, the effect was more significant concerning their own animals. Indeed, 60% of the respondents having animals felt less lonely thanks to them.

Of course such results should be used with caution since the pool of participants is biased toward women, wealthy and educated people having a garden and familiar with biodiversity. Nonetheless, a detailed analysis of the results (Appendix 1) reveals that positive impacts of the lockdown, although with various intensity, were found for each profile. People declared they spent much more time taking care of their animals and plants. They groomed their pets more, played more with their dogs, took time to prune their trees, sow seeds, and water the garden. The participants mentioned that they got to know their animals better: what do cats eat, when do dogs sleep during the day and for how long, how do hamsters react to a new environment, how to recognize different types of hens. Some of them also explained the impact of the lockdown on their pet behavior. Lot of people declared they observed their plants and trees more. Thanks to the spring season, they mentioned for instance the growing of the leaves and the appearance of the first flowers. Through their observation, they learn new things about them: “... it's the first time I have the opportunity to observe the seedlings grow and to realize that there are similarities and small differences between tomatoes and egg plants” (Answer no. 786). Overall, the respondents do not only say they interact and observe more but also that they do it better and with much more precision: “I observe the slightest changes there can be, several times a day. I water them regularly, I realize their speed of growth, their needs...” (Answer no. 639).

People spend also more time observing and listening to birds, from their balcony, in their garden or outside during their walk. Several people mentioned that they tried to communicate with them by whistling: “Once or twice, when walking in the street, I answered to a bird. I think it was because there were fewer people there and no cars” (Answer no. 120). “I'm whistling and sometimes I got the impression that they are answering” (Answer no. 357). Participants also said they took more care of birds by for instance protecting them from their cats, giving them food, water or building them a nest or a feeder. People declaring that they learned new things about birds mentioned their feeding habits, the variety of singing, behavioral differences and interactions between bird species. Interestingly, people often mentioned how they observe, interact with and get to know specific, well identified individuals: “One bird specifically comes back every day and several times a day to stand on close by the house. When I'm reading, I often stop to observe and listen to him/her” (Answer no. 830). “There is one pair of birds of prey that fly always at the same time above the house and one pair of red-tailed birds that have nested between the roof and the chimney” (Answer no. 825).

People observe more the plants and trees in the greenspaces around their home or in their neighboring gardens. Several respondents declared that they sketched them or took pictures of them and that they learned more about their phenology: plant growth speed, leaf color changes and flowering. Although some of the participants regretted the fact that they have only poor access to plants and trees within their surrounding, others mentioned it as a reminder to pay more attention, to be more mindful: “there is only a little greenery around my place. I walk there and understand how lucky I am as well as the scarcity of these spaces. I take full advantage of it, with ‘gratitude’” (Answer no. 819). They declared how access to such greenspaces and interaction with plants and trees comforts them: “On a walk, I touch the trees, hug them and sit against them. It regenerates me. I felt a strong lack of nature, especially at the beginning of the confinement. My walks were life-saving” (Answer no. 1062).

People who declared observing and interacting more with other animals mentioned species such as snakes, different insects, rats, lizards, or squirrels. Observations focus mainly on behavior: “I've spent two weeks observing a bee in the holes of the veranda door. I really spent several hours observing it. I think I would have never taken this time before” (Answer no. 120). Although several people mentioned they should leave such animals alone (“I don't want to encroach on their territory and their lives” (Answer no. 975)), others mentioned how they took care of them by protecting one animal from the other, by gently



releasing insects which were trapped indoors. As for plants and trees, several participants also declared they did not spend more time interacting with or observing such animals because they have poor access to nature.

### 3.2. The impact of the participant profiles

My results reveal that the profile of the participants can play a part on how the lockdown influenced their relationships with other species (Table 1). The gender effect is clearly the most important one. For all species groups, the lockdown had more impact on women than on men regarding their observation/interaction with non-humans as well as how the latter helped them fight loneliness. Women also declared more than men that they learned new things from plants and from their animals.

Additionally, the degree of access to nature has also a strong positive effect on the respondents observation/interaction with other animals and other plants, on their leaning from animals as well on the way home plants, birds, other plants and animals helped participants feel less lonely. People who have their own garden are also more positively impacted concerning their observation/interaction with their home plants and birds as well as regarding their learning from birds and other animals. They also declared fewer times than others that they were positively impacted regarding how their animals helped them feel less lonely. People living in the countryside have been less impacted than others in their observation/interaction with their animals. While they were also less impacted regarding what they learn from the latter, they declared more than others that they learned from plants. Participants with experience in biodiversity conservation, study or management overall have been more impacted by the lockdown in terms of their observation and interaction with other species except concerning their animals. Interestingly, they learned more than others from birds and said more often than others that they felt less lonely thanks to them. Educated people as well have been more impacted regarding their observation/interaction with their plants, birds and other plants but declared less than others that their animals and the other animals helped them feel less lonely. Being active has only a positive effect on the respondents observation and interaction with animals. Older people have been overall less impacted than others regarding their observation/interaction with other species and declared less than others that they learned something from plants or that they felt less lonely thanks to their animals. People living alone have been less impacted in their observation/interaction with birds and other plants and their learning from birds. Their animals and their plants helped them more to fight loneliness. Finally, people being confined for a longer period declared

more than others that the lockdown had an effect on what they learned from their animals and from other plants. Compared to other participants, the other plants helped them more overcome loneliness while their animals helped them less.

### 4. Discussion

This study shows that the Covid-19 lockdown affected the human relationship with other species. The questionnaire answers provide diverse stories about how people took more care of their pets, observed the daily growth of plants, fed wild animals, rescued insects, got to know specific birds individually, etc. People did not only declare that they observed and interacted more with non human species but also that they learned new things about them and that they felt less lonely thanks to them.

If the pandemic has been considered as an opportunity to take a step back, to understand the “grave consequences of causing an imbalance in natural processes shaped over millennia” (Bang and Khadakkar, 2020), this study demonstrates that the zoonosis was first of all an opportunity in itself to concretely reconnect with nature. Whereas several studies have shown how biodiversity clawed back spaces in human-dominated landscape (e.g. Pearson et al., 2020; Gordo et al., 2020; Silva-Rodríguez et al., 2020), my work rather shows how the lockdown modified people attention toward other beings. Non-humans species did not only recover spatially but as well in the everyday life of humans and this can also lead to a positive impact on biodiversity. Indeed, it is recognized that an increased experience of nature is likely to improve people commitment to protect wildlife (Chan et al., 2016; Prévot et al., 2018; Cazalis and Prévot, 2019).

This study demonstrates how new experiences can emerge from societal changes. Due to the lockdown, movements and social interactions have been drastically reduced whereas time spent at home has consistently increased. This transformation of the everyday life of people induced significant changes in their relationship with other species. Nonetheless, this study further demonstrates that such major changes do not equally impact people. Indeed, participants with different profiles have been affected differently regarding their relationship with other beings during the lockdown.

In particular, there was a clear insight that women have been more positively impacted than men in terms of their observation, interaction, learning regarding different species as well as how the latter influences their loneliness. Although it is known that women have a different sensitivity for nature (Merchant, 1996), this study contributes to show that they are also more sensitive to changes. The environment in which people live also appears to be determinant regarding how a major change

**Table 1**

The effects of the participants profiles on their answers. The results report the positive (black) or negative (grey) significant effects ( $p > 0.001$ ) of the different variables on the three categories of answers (observing/interacting, learning, feeling less lonely) for each of the considered species groups. Results are extracted from the logistic binomial regressions which detailed results are presented in Appendix 2.

		Observing/Interacting					Learning					Feeling less lonely				
		Own animals	Home plants	Birds	Other plants	Other animals	Own animals	Home plants	Birds	Other plants	Other animals	Own animals	Home plants	Birds	Other plants	Other animals
Gender	Female															
Worker/Student	Yes															
Alone	Yes															
Education	> High school degree															
Age	Between 40 and 60															
	More than 60															
Nature expert	Yes															
Garden	Yes															
Nature access	Access to a park															
	Access to nature															
	City outskirts															
Location	Rural															
Time confined																

can impact their relationships toward nature. Although living in a city versus living in the countryside does not seem to affect that much the respondents' sensitivity, people having a garden, access to a park or living close to natural environments were more likely to change their relationship with other species during the lockdown.

Other characteristics of the participants had an impact on their answers. For instance, older people were overall less affected than others. Educated people seemed to be more sensitive in their observation/interaction with plants and birds but less than others regarding how animals helped them to feel less lonely. Participants being already familiar with biodiversity are more likely to be impacted and have stronger sensitivity to birds. People living alone have been more affected regarding how their plants and animals helped them fight against loneliness, but have been less sensitive in terms of observation, interaction and learning from other species. People being confined for longer periods of time seem to have developed a higher sensitivity to a priori less accessible species namely the plants. Such observations generate a number of hypotheses and further studies would be valuable to fully address the involved mechanisms. For instance, it would be interesting to understand whether educated people are more rational toward nature whereas less educated people would be more emotional and how being in a group and living collectively could facilitate the observation, interaction and learning from wild species.

Of course, it is very unlikely that a 2 month confinement or even a 1 or 2 year pandemic will transform human relation to other beings in the long term. But, while some authors claimed that the "concerted and urgent global response to Covid-19 should pave the way for similar responses to global ecological crises (Bang and Khadakkar, 2020)", the main interest of my study is to demonstrate how such responses can also transform people experience of nature. Acting as a real world experiment, the lockdown does not only reveal how a major change in society can trigger this experience but also who may be more impacted. Experiences of nature are complex and diverse and are embedded in social, cultural and political contexts (Clayton et al., 2017). One of the main conclusions of this study is that people are not equal regarding changes such as the ones induced by the lockdown. Although it is globally accepted that mankind needs to reconnect with nature and to develop a new sensitivity toward other beings, this study contributes to demonstrate the importance of considering such issues in light of the social and political organizations of human societies. In that respect, I identified key profiles that should be considered when facing deep and global societal changes.

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## CRediT authorship contribution statement

R. Vimal conducted all the steps of the study. He is the sole author of the manuscript.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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